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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|---|-------------|----------------------|---------------------|---------------------|
| 10/581,582 | 08/28/2007 | Nicolas Zartenar | 1943-061213 | 6997 |
| 28289 | 7590 | 12/23/2010 | EXAMINER | |
| THE WEBB LAW FIRM, P.C. 700 KOPPERS BUILDING 436 SEVENTH AVENUE PITTSBURGH, PA 15219 | | | | MERKLING, MATTHEW J |
| ART UNIT | | PAPER NUMBER | | |
| 1723 | | | | |
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

| | | |
|------------------------------|------------------------|---------------------|
| Office Action Summary | Application No. | Applicant(s) |
| | 10/581,582 | ZARTENAR ET AL. |
| | Examiner | Art Unit |
| | MATTHEW J. MERKLING | 1723 |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) Responsive to communication(s) filed on 02 June 2006.
- 2a) This action is **FINAL**. 2b) This action is non-final.
- 3) Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) Claim(s) 11-23 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) Claim(s) _____ is/are allowed.
- 6) Claim(s) 11-23 is/are rejected.
- 7) Claim(s) _____ is/are objected to.
- 8) Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) The specification is objected to by the Examiner.
- 10) The drawing(s) filed on _____ is/are: a) accepted or b) objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) All b) Some * c) None of:
 1. Certified copies of the priority documents have been received.
 2. Certified copies of the priority documents have been received in Application No. _____.
 3. Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) Notice of References Cited (PTO-892)
- 2) Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date 9/17/07
- 4) Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ .
- 5) Notice of Informal Patent Application
- 6) Other: _____

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

3. Claims 11-23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kuwaba (US 6,632,409) in view of Zartenar (WO 03/080505 A1 with English Language Equivalent US 2005/0172553).

Regarding claims 11 and 21, Kuwaba discloses an apparatus for producing hydrogen (see abstract), comprising

- a) a reformer stage (13) for converting hydrocarbon gas and water into hydrogen and at least one further reformer product (such as carbon monoxide, see abstract),
- c) a CO reducing stage (16, see Fig. 4), which is connected downstream from the reforming stage and has axial flow (see Fig. 4 where flow through section 16 is axial), to

which a flow guiding housing for a coolant extending in the axial flow direction is assigned (such as cooling channels 15D, 15E traversing through CO reducing stage, see Fig. 4) wherein the flow guiding housing has at least two cooling zones (16A, 16B) having different cooling effects situated one behind another in an axial direction (see Fig. 4).

Kuwaba teaches a reforming apparatus followed by a means to reduce carbon monoxide in the reformatte. However, Kuwaba does not explicitly teach a catalyst stage between the reforming stage and the CO reducing stage, and further does not teach that the CO reducing stage is a methanation stage.

Zartenar also discloses a reforming apparatus with a carbon monoxide reduction means (see abstract).

Zartenar teaches a reforming stage (1) that is followed by a catalyst stage (2) and a methanation stage (not shown in Figure, but disclosed in paragraph 3). Zartenar teaches utilizing such a sequence of process steps in order to eliminate as much carbon monoxide from the reformatte as possible, as well as generating more hydrogen by utilizing a shift reaction (paragraph 3).

As such, it would have been obvious to one of ordinary skill in the art at the time of the invention to add the catalyst (shift) stage and the methanation stage of Zartenar to the apparatus of Kuwaba in order to eliminate as much carbon monoxide from the reformatte as possible, as well as generating more hydrogen by utilizing a shift reaction.

Regarding claim 12, Kuwaba further discloses the coolant is supplied separately to each of the cooling zones (see Fig. 4 where each coolant zone 16A, 16B has its own coolant supply).

Regarding claim 13, Kuwaba, as modified above, teaches a methanation zone with coolant zones situated as tubes through the methanation zone. Kuwaba, however, does not explicitly teach the cooling zones enclose the methanization stage as annular chambers situated one after another or, with a hollow-cylindrical implementation of the methanization stage, are enclosed thereby.

Zartenar teaches that cooling stages around the methanation stage are preferably enclosures/annular chambers in order to equilibrate the axial temperature variations in the methanation stage and reduce the degradation of the gas quality (paragraph 47).

As such, it would have been obvious to one of ordinary skill in the art at the time of the invention to replace the conduit shaped coolers of modified Kuwaba with the annular enclosures of Zartenar in order to equilibrate the axial temperature variations in the methanation stage and reduce the degradation of the gas quality.

Regarding claim 14, Kuwaba further discloses each cooling zone (16A, 16B) has at least one coolant supply connection and one coolant removal connection (see Fig. 4).

Regarding claim 15, Kuwaba further discloses each cooling zone may have coolant flow through it alternately in parallel/co-current flow or counterflow to the methanization stage (see Fig. 4 which illustrates that at certain points while the cooling medium is traveling through conduits 15D and 15E, it is both co-current and countercurrent to the flow of the methanation stage).

Regarding claim 16, Kuwaba further discloses different coolants are supplied to the cooling zones (see Fig. 4).

Regarding claim 17, Kuwaba, as modified by Zartenar above, further discloses the cooling zones situated one behind another in the axial direction are directly hydraulically connected to one another (see Kuwaba Fig. 4 where the zones are one behind the other in the axial direction), and have different flow cross-sections (each zone has a different cross section re: catalyst), the cooling zones alternately having at least one of stepped flow cross-sections and continuously changing flow cross-sections in the axial direction (see Fig. 4 of Kuwaba where the cross-sections of the cooling zones are different) and the cooling zones are adapted to have coolant flow through them alternately in parallel flow or counterflow to the methanization stage (see Fig. 4 which illustrates that at certain points while the cooling medium is traveling through conduits 15D and 15E, it is both co-current and countercurrent to the flow of the methanation stage).

Regarding claims 18-20, Kuwaba does not explicitly teach at least one of the reformer stage, the catalyst stage, and the methanization stage are implemented as hollow cylinders.

Zartenar teaches the reforming stage, catalyst stage and the methanation stage are hollow cylinders in order to provide a more uniform temperature distribution in the radial direction (paragraph 32).

As such, it would have been obvious to one of ordinary skill in the art at the time of the invention to add the hollow cylinder structure of Zartenar to the reforming stage, the

catalyst stage and the methanization stage, or just the reforming stage and the catalyst stage, in order to provide a more uniform temperature distribution in the radial direction.

Regarding claim 22, Kuwaba, as discussed above, teaches a flow guide housing that has two cooling zones, but does not teach one that has 3 cooling zones. However, the addition of one more cooling zone would be nothing more than a mere duplication of parts. A mere duplication of parts has no patentable significance unless a new and unexpected result is produced (MPEP §2144.04(VI)(B)). In this case, adding one more cooling zone would give more flexibility in controlling the temperature profile of the methanation reactor and would be entirely predictable.

Regarding limitations recited in claim 23 which are directed to a manner of operating disclosed system, neither the manner of operating a disclosed device nor material or article worked upon further limit an apparatus claim. Said limitations do not differentiate apparatus claims from prior art. See MPEP §2114 and 2115. Further, process limitations do not have a patentable weight in an apparatus claim. See Ex parte Thibault, 164 USPQ 666, 667 (Bd. App. 1969) that states "Expressions relating the apparatus to contents thereof and to an intended operation are of no significance in determining patentability of the apparatus claim.

Conclusion

4. Any inquiry concerning this communication or earlier communications from the examiner should be directed to MATTHEW J. MERKLING whose telephone number is (571)272-9813. The examiner can normally be reached on M-F 8:30-4:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Alexa Neckel can be reached on (571) 272-1446. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/M. J. M./
Examiner, Art Unit 1723

/Alexa D. Neckel/
Supervisory Patent Examiner, Art Unit 1723